A CRITICAL REVIEW OF GASTROSCOPY*

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IT IS now over ten years since gastroscopy by means of a flexible gastroscope was first introduced in this country at the Massachusetts General Hospital.[1] It, therefore, seems appropriate to make a decennial report on the present status of gastroscopy. During this period we have made 1600 gastroscopic examinations, or an average of only about three per week. I believe this indicates that the hospital staff is still not fully aware of the value of the procedure, nor the ease with which it can be performed. This is unfortunate, but must be expected with any new method of examination. On the other hand, the relatively small number of cases examined shows that we are not making it a routine method of study, and I believe this is fortunate since special studies should be undertaken for specific indications.

INSTRUMENT

In 1932 Rudolf Schindler, a German physician, collaborated with George Wolf, an optical physicist, to produce the Wolf-Schindler flexible gastroscope.[2] There are fifty-one elements in the optical system. Each lens is of short focal length and conveys the image to the next lens, so even when the flexible portion is curved it is still possible to see through it. The great flexibility of the lower part facilitates, as well as safeguards its passage through the esophagus into the stomach. The history of gastroscopy prior to 1932 deals with rigid instruments of various shapes and sizes, all of which were finally discarded as being too unsafe for practical use. The safety of the present instrument is attested by the fact that only one death occurred in over 22,000 examinations by sixty gastroscopists (0.004 per cent). Two modifications of the flexible gastroscope (Fig. 1) are worthy of mention: (1) The omniangle feature developed by Cameron which enables the operator to increase the range

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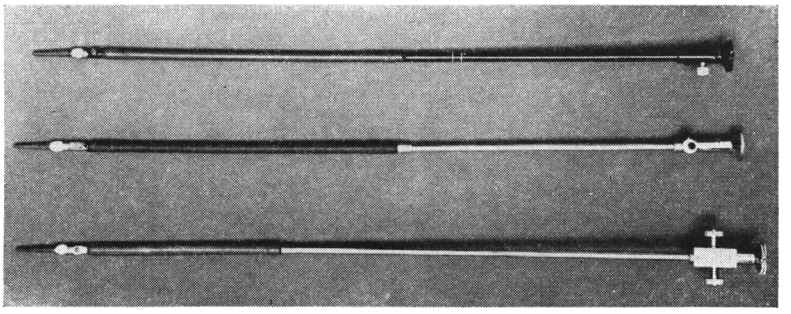

Fig. 1. Wolf-Schindler flexible gastroscope; Cameron omniangle flexible gastroscope showing mirror at distal end, angle of which is controlled by electromagnet; Taylor flexible gastroscope showing ratchet handle for controlling the flexible portion.

of vision by changing the angle of the mirror at the distal end. This is accomplished by an electromagnet controlled by a switch at the proximal end. Although this makes the instrument slightly more difficult to pass, I believe the better view obtained more than justifies its use. (2) The Taylor gastroscope,[3] the flexible part of which can be curled up or allowed to lie flaccid. It is flexible in all directions, but can be bent forward and backward in the plane of the objective up to the limits of optical flexibility. This control is obtained by a mechanical device manipulated from the proximal end of the instrument. By reason of this controllable flexibility, Taylor claims the following advantages: "Greater safety of instrumentation, less likelihood of failure of instrumentation, abolition of blind areas in the stomach, ability to move the instrument about in the stomach so as to inspect any particular area closely at will and from more than one angle and greatly increased illumination with less distortion of the image." On the other hand, Schindler believes that since the Taylor gastroscope has a shorter flexible portion and a longer rigid portion it will be less safe than the Schindler gastroscope because the rigid portion will extend below the cardiac orifice where trauma is likely to occur.

Technique

In spite of the fact that in many patients gastroscopy can be satisfactorily performed without preliminary sedation, I believe that medication with nembutal, morphine and atropine tends to allay apprehen-

sion and to provide better relaxation. The most satisfactory anesthesia of the throat is a simple gargle with 4 per cent cocaine or 5 per cent larocaine. The latter is unobtainable at the present time due to the war. Two per cent pontocaine gargle gives satisfactory anesthesia, but reactions have been reported.[4] Preliminary lavage or drainage of the stomach is necessary only when there is pyloric obstruction; since it takes extra time and is somewhat upsetting to the patient, it is to be avoided if possible. The use of small pillows instead of a head holder is to be recommended because it simplifies the technique, obviates the necessity for a trained assistant, and gives the patient more confidence in firm head support. My feeling is that in all matters of technique the simplest procedures compatible with good results are the best. Using this technique, more than one patient has voluntarily remarked that he would rather have the gastroscope passed than the nasal tube.

Indications and Contraindications

It is imperative for physicians to know when special procedures should be used. The indications for gastroscopy[5] may be listed as follows: gastritis; unexplained gastrointestinal hemorrhage; so-called "gastric neurosis"; unexplained persistent gastrointestinal symptoms, with negative or inconclusive x-ray examination; gastric ulcer, to determine the appearance and location of the lesion, to differentiate benign from malignant ulcer, and to follow the healing process in benign ulcer; duodenal ulcer, to study the gastric mucosa for the presence of gastritis, gastric erosions or gastric ulcerations; carcinoma, to determine the gross appearance, extent and operability of the lesion; polyposis; the so-called "postoperative stomach"; and occasional cases of suspected foreign body in the stomach. In addition to these indications, we have studied a number of other patients by gastroscopy, including those with pernicious anemia, food allergy, unexplained hematemesis or melena, hiatus hernia, deficiency disease, seasickness, lymphoma, sarcoma, benign tumor and submucosal tumor.

Although in many cases x-ray examination of the stomach may give a positive diagnosis, gastroscopy will often contribute additional information. No stomach which is producing symptoms should be considered normal without gastroscopic study. Gastroscopy bears much the same relationship to gastroenterology as cystoscopy bears to urology.

There are relatively few contraindications to the passage of the gas-

troscope. Esophageal obstruction is the only absolute contraindication. Aortic aneurysm probably should be considered a contraindication. In order to exclude esophageal obstruction it is the policy of the author always to have x-ray examination of the esophagus before gastroscopy. Among the relative contraindications which should be mentioned are esophageal varices, esophageal diverticulum, cardiac decompensation, cervical arthritis and marked debility. Extreme kyphosis or psychoneurosis also may be contraindications. Occasionally patients are so uncooperative that gastroscopy may be very difficult or unwise.

Gastritis

Gastritis is the commonest disease of the stomach. Everyone agrees that the best method of diagnosis is by gastroscopy. A positive x-ray diagnosis of gastritis when made by an observer experienced in the relief technique is usually of some significance, but should be checked by gastroscopy for the following reasons: (1) To determine whether or not gastritis is really present, for occasionally the enlarged rugae and other roentgen criteria in the diagnosis of gastritis seem to be of little or no significance; (2) to study the type, degree, location and extent of the gastritis if present; (3) to note the presence or absence of erosions or superficial ulcerations; (4) to demonstrate additional pathology, as, for example, a gastric ulcer not seen by x-ray; and (5) to help differentiate hypertrophic gastritis from carcinoma, sometimes an impossible differential diagnosis even with all methods of examination.

Acute or superficial gastritis is a disease usually of relatively short duration characterized by no typical symptomatology, but often accompanied by vague epigastric pain or distress, sometimes gas, nausea, vomiting and anorexia. Alcoholic gastritis is usually of the acute superficial variety, but Gray and Schindler[6] observed that the stomachs of 55 per cent of chronic alcoholics were essentially normal, the remaining 45 per cent showing mainly superficial gastritis, atrophic gastritis or a combination of the two. No method of diagnosis is reliable except gastroscopy. The gastroscopic picture is characterized by reddening of the mucosa, edema, and adherent secretion.

Chronic or hypertrophic gastritis often very closely simulates peptic ulcer in symptomatology. In a study of 117 cases of hypertrophic gastritis occurring without other gastric or duodenal pathology, Benedict[7] found the commonest symptom was epigastric pain, which occurred in

74 per cent of the cases. It was relieved by food or soda in 81 per cent, related to meals in 52 per cent and present at night in 21 per cent. Other frequent symptoms were vomiting (45 per cent), hemorrhage (42 per cent), gas (41 per cent), sour eructations (16 per cent) and heartburn (15 per cent). Clinical improvement was in most cases definitely correlated with the improvement in the gastric mucosa as seen by gastroscopy.

Atrophic gastritis, perhaps better called gastric atrophy, may occur as an independent disease characterized by vague indigestion, anorexia, weakness and anacidity, but the diagnosis is more commonly made when it occurs in association with pernicious anemia. In either case, the gastroscopic picture is unmistakable, the gastric mucosa exhibiting a smooth pale, grayish yellow or grayish green appearance with a network of blood vessels easily visible shining through the thin layers of the stomach wall. The probability that tumors of the stomach arise from an already diseased mucosa and the fact that they occur more commonly in an atrophic mucosa makes the diagnosis of gastric atrophy an important one from the standpoint of carcinoma.

Postoperative gastritis has been put in a class by itself by some observers, but I do not see how it can be so considered. Most stomachs that have been operated upon have been the site of ulcer or cancer and all ulcers and cancers are accompanied by some gastritis. The fact that a certain amount of gastritis persists after gastrojejunostomy or resection is to be expected. It is usually of the superficial or hypertrophic variety, or a combination of both.

Hemorrhage is a very important finding in gastritis and may occur in any type of gastritis with any degree of severity. In a study of 42 cases of bleeding from gastritis[8] I found 13 cases had bled from the superficial variety, 12 hypertrophic, 2 atrophic, 5 postoperative and 10 mixed. There had been 7 mild, 14 moderate, and 21 severe hemorrhages. X-ray examination was negative in 33 of the 42 cases. Erosions, superficial ulcerations and an edematous hyperemic friable mucosa with generalized oozing were the sources of the bleeding.

There is no specific treatment for superficial or hypertrophic gastritis. The superficial or acute variety usually responds fairly readily to the usual dietary measures with elimination of alcohol, limitation of tobacco, and dental attention. Sixty-three per cent of the cases of hypertrophic gastritis recently studied were relieved by bland diet with or

without alkali, belladonna, hydrochloric acid, etc. All cases of gastric atrophy respond to peroral or intramuscular liver therapy,[9] only a few respond poorly, the majority being entirely relieved. The gastroscopic appearance of the mucosa may be very much improved following adequate liver therapy.

The correlation of gastroscopic and pathological findings in gastritis[10] has been shown to be fairly accurate. Superficial gastritis as described by the gastroscopist corresponds to the acute exudative gastritis of the pathologist. The term atrophic gastritis is used by both gastroscopist and pathologist to denote the same type of mucosa. Hypertrophic gastritis as described gastroscopically corresponds to an exaggerated form of the physiological plasma cell and lymphocytic infiltration of the normal stomach. In the series of 51 cases of all types of gastritis carefully studied there was complete or partial gastroscopic-pathological agreement in 88 per cent.

Ulcer

In the study of gastric ulcer gastroscopy may reveal an ulcer not previously proven, may demonstrate multiple ulcers in a patient suspected of having only one lesion, may indicate that a severe gastritis accompanies the ulcer, and may be of assistance in differentiating a benign from a malignant lesion.

Walters and Clagett[11] have recently pointed out that although the accuracy of roentgenologic diagnosis of lesions of the stomach is remarkably high, there is always the chance that a small lesion or one situated high in the stomach may be overlooked. Gastroscopy should always be considered in a patient in whom there is a suggestion of a gastric lesion even though the roentgenologic examination does not reveal any abnormality. We know that erosions and superficial ulcerations frequently accompany gastritis and that such lesions are usually demonstrable only by gastroscopy. They indicate an inflammatory process with destruction of the mucosa and are, therefore, real ulcers even though there may be a difference of opinion as to whether or not they are true peptic ulcers. At any rate, there is no doubt that such erosions and superficial ulcerations may be the cause of symptoms and, therefore, the knowledge of their presence is of great importance. The fact that such lesions do not always cause symptoms is no reason to discredit their significance for a large peptic ulcer may be present without giving rise

to symptoms. The demonstration of more than one ulcer or of a severe gastritis accompanying an ulcer may alter the course of medical or surgical treatment, for a knowledge of the location and appearance of the ulcer or ulcers, and information as to the localization and severity of the gastritis will influence one's decision as to the medical regimen or the optimum time for surgery.

The differentiation of benign from malignant lesions of the stomach may be difficult or impossible. Templeton and Boyer[12] have pointed out, however, that inasmuch as no one method of examination is infallible, the use of all clinical, laboratory, roentgenologic and gastroscopic methods together is more likely to lead to a correct diagnosis. Each examination supplements the other and the wise physician will study the patient as a whole. When the roentgenologist is doubtful, the gastroscopist may be reasonably certain and vice versa. In a recent case the roentgenologist saw a lesion in the antrum, but was doubtful as to its nature. A gastroscopy was requested which showed a sloughing nodular ulcerating lesion obviously malignant (later proven at operation). In other cases the ulcer seen by gastroscopy may look benign, but x-ray may show so much rigidity that malignancy is almost a certainty. Usually an ulcer which appears to have sharp margins and a clean gray base is benign and an ulcer with slightly ragged, irregular or nodular margins and a dirty base is malignant. There will be a few cases, however, where all methods of study are doubtful, and unless complete healing takes place within three weeks they should be explored surgically. I believe that no patient should be discharged from the hospital with an unhealed gastric lesion.

Duodenal ulcer cannot be examined by gastroscopy, but the accompanying gastritis which pathologists say is always present can and often should be studied. Occasionally the gastritis is so severe that it is of more importance than the ulcer. I have seen a duodenal ulcer heal completely by x-ray, but symptoms persist or get worse due to severe gastritis. Hemorrhage supposed to have come from a proven duodenal ulcer may in fact have been coming partly or wholly from the gastritis. In a previous paper, 24 cases of gastritis and hemorrhage were discussed in which the question of ulcer was also raised. Since there was no evidence of an active ulcer crater by x-ray in 14 of those cases, the bleeding must have been from the gastritis. A knowledge of the appearance of the gastric mucosa may, therefore, be of importance in duodenal ulcer.

Gastrojejunal ulcer may occasionally be more readily demonstrated

by gastroscopy than by any other method of examination. As a rule, this is true only when the ulcer is on the gastric side of the stoma, for only a small part of the jejunum is visible by gastroscopy even under favorable conditions, and there are times when the stoma may not be seen at all. In doubtful cases gastroscopy should be performed.

Neoplasm

Carcinoma is the commonest neoplasm of the stomach and when it reaches a certain size the x-ray diagnosis is usually unmistakable. Unfortunately, by that time it may be inoperable. Even more unfortunate is the fact that before that time the patient may not have enough symptoms to consult a doctor, or if he does the doctor may not order an x-ray. Every patient over 35 with indigestion lasting more than a few days should have x-ray examination of his gastrointestinal tract. If such x-ray is negative or doubtful, he should have a gastroscopy. In the early diagnosis of carcinoma, gastroscopy will be of more value as it is used more frequently, but the average clinician accepts a negative x-ray as final and does not request gastroscopy. In the face of persistent symptoms, this is inexcusable, but is due in part to the relative novelty of the method and to the fact that many doctors and patients erroneously consider gastroscopic examination a terrific ordeal. In my experience roentgenologists are more apt to request gastroscopy than clinicians, and they do so whenever they are in doubt about the diagnosis, realizing the limitations of their own method and the supplemental value of gastroscopy. When x-ray examination is difficult due to obesity or high position of the stomach, gastroscopy may be easy and give a correct diagnosis at once. Helpful information as to the appearance, location, and extent of the growth may be added by gastroscopy.[13]

Since it is well known that an atrophic gastric mucosa provides a fertile soil for the development of carcinoma, the diagnosis of gastric atrophy, which can be made only by gastroscopy, assumes an added significance. Whenever this diagnosis is made, the patient should be followed by frequent x-ray and gastroscopic examinations to detect early malignancy. Gastric atrophy occurs not only in association with pernicious anemia, sprue, beriberi, pellagra and other deficiency diseases, but also as an independent entity. Vague indigestion and easy fatigability may point to gastric atrophy. According to Schindler,[14] superficial gastritis may go on to atrophy, which makes the diagnosis of gastritis and

especially the type of gastritis doubly important. In this connection also Hurst has remarked that carcinoma does not develop in a normal healthy gastric mucosa. We must, therefore, know more intimately by direct inspection the appearance of the gastric mucosa in many of our patients.

Other malignant tumors of the stomach are rare and can usually not be differentiated from carcinoma by any method of examination. Doubtful cases should be examined by gastroscopy.

In benign tumors of the stomach, gastroscopic examination is helpful in studying the base of the lesion for the extent of its attachment, and the surface of the lesion for the presence or absence of ulceration. Adenomatous polyps with a broad base tend to become malignant and should, therefore, be removed surgically. Some of the smaller polyps can be seen only by gastroscopy. The differential diagnosis between true polyp and pseudo-polyp can usually be made quite readily by direct inspection, for when the stomach is inflated with air the pseudo-polyps tend to disappear. Submucosal tumors may be observed directly as to size, presence or absence of ulceration, and normal or abnormal peristaltic wave. Two cases recently reported[15] come to mind, in one of which a diagnosis of cancer was changed by gastroscopy to leiomyoma or neurofibroma, later proven and successfully removed surgically; and in the other a stomach apparently normal by x-ray was shown to be the site of a submucosal antral tumor, later proven at operation to be an inoperable carcinoma of the pancreas invading the wall of the stomach.

Gastroscopy in the Armed Forces

In the present war the incidence of gastric disease is notably high. All methods of examining the stomach are, therefore, extremely important. When a soldier complains of digestive symptoms and x-ray study is negative, are we dealing with gastritis or malingering? When a sailor is constantly seasick, can he be used for occasional sea duty on large vessels, must he be kept for shore duty, or has he a really incapacitating gastritis? Gastroscopy is helping us to answer these questions.

Gastroscopy and X-Ray Examination

These two methods are so entirely different that comparison is not fair. One method supplements the other. X-ray examination should be done first because (1) it is easier, (2) in a given case it may furnish all the required information, and (3) it provides information as to the

normality of the esophagus which the gastroscopist should possess before blindly passing his instrument. In a general way it may be said that x-ray examination is of greater value in the study of gross changes, such as large ulcers and tumors, whereas gastroscopy is superior in the study of the finer mucosal changes as seen in gastritis. In modern medicine both methods are indispensable.

Conclusion

Gastroscopy with the flexible gastroscope is an easy and safe procedure, the value of which cannot be doubted. Attention has been called to the omniangle feature and controllable flexibility of certain instruments.

The simpler the technique the better. Four per cent cocaine gargle and small pillows for head support are to be preferred to more complicated methods.

The indications for gastroscopy have been outlined. No stomach which is producing symptoms should be considered normal without gastroscopic study.

The significance of hemorrhage from gastritis has been demonstrated by gastroscopy.

Gastroscopic and pathological findings in gastritis have been correlated.

The usefulness of gastroscopy in gastritis, ulcer and tumor has been critically reviewed.

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